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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/759,179	01/12/2001	Martin Hillebrand Bles	NL 000044	9984

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EXAMINER

KACKAR, RAM N

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/759,179

Applicant(s)

BLEES, MARTIN HILLEBRAND

Examiner

Ram N Kackar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-7 and 11-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-7 and 11-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Whitesides et al (US 5900160) in view of Biebuyck et al (US 5817242) and as evidenced by Hawkins et al (US 5201987).

Whitesides et al disclose a stamp (Fig 3a) for use in a lithographic process, comprising a body (3a), a printing face (26), recesses with apertures (24), the recesses becoming narrower as the distance from printing face increases (3a) and projection of the recesses lying within the apertures (3a), the recess having a triangular shape (Fig 10 and Col 15 lines 39-49).

Whitesides et al do not expressly disclose recesses of different apertures and or different depths, especially third recess having an aperture at least five times the aperture of the first recess and a greater depth. However, in the real world applications the recesses would be of different sizes, in order to pattern features of different sizes. Whitesides et al do not disclose the Young's Modulus of the stamp body.

Biebuyck et al (Fig 2D) disclose a stamp with different sized apertures and disclose a composite stamp with deformable or elastic layer of a material having Young's modulus to be 10^4 - 10^7 dynes/cm² ($1 \text{ N/m}^2 = 10 \text{ dynes/cm}^2$) and another layer of different material. Biebuyck et al further teach that both the materials could be independently optimized and the other layer

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(patterned layer) could have higher Young's modulus greater than 10^6 dynes/cm² (Col 1 line 62-Col 2 line 33).

Whitesides et al teach that the aspect ratios should be between 0.2 and 2. This means that in general with a greater recess the depth would also be proportionally greater. This is further evidenced by the method of making stamp where a larger area exposed to anisotropic etch would produce a recess with greater depth. This fact is disclosed by Hawkins et al who teach (Fig 6 and Col 5 lines 19-23) that in a single isotropic etch varying depths will be obtained for different size of vias.

Therefore it would have been obvious to one of ordinary skill in the art at the time invention was made to have a stamp with varying number of recesses and varying recess apertures depending upon the features needed. If that includes three recesses with third recess aperture more than five times or more than 20 times the aperture of the first recess the stamp would obviously need to have it.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Whitesides et al (US 5900160) in view of Biebuyck et al (US 5817242) and as evidenced by Hawkins et al (US 5201987) as applied to claim 1 and further in view of Maracas et al (US 5937758).

Whitesides et al (US 5900160) as modified by Biebuyck et al (US 5817242) disclose a micro contact-printing stamp but do not expressly disclose feature size to be less than 1 μ m.

Maracas et al disclose a stamp with micron /sub micron feature size (Col 3 line 22-25 and Col 8 line 17-18).

As feature size in integrated circuits is being required to be more and more narrower, it would have been obvious for one of ordinary skill in the art at the time invention was made to make the stamp of Hawker with sub micron feature size to be able to pattern sub micron features.

4. Claims 6 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Whitesides et al (US 5900160) in view of Biebuyck et al (US 5817242).

Whitesides et al disclose a method of manufacturing a stamp for use in a lithographic process (Fig 8a-9f Col 14 line 28 to Col 15 line 19) which includes anisotropic etching of a surface, to produce a recess which becomes narrower as its distance to the original surface increases (Fig 8d and Col 15 line 10-19), its projection always lying in the aperture and making a replica of the patterned mold surface (Fig 9d-e and Col 14 lines 65-66).

Whitesides et al do not expressly disclose recesses of different apertures. However the method of manufacturing a stamp of different apertures would be to use masking of different apertures. The disclosed method of anisotropic etching will make a triangular etch of deeper proportion for larger area exposed to etch compared to a smaller area. Whitesides et al do not also disclose an unmolding agent between the mold and first body.

Biebuyck et al (Fig 2D) disclose an unmolding agent perfluorinated silane (Fig 2A -21 and Col 4 lines 7-9).

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Therefore it would have been obvious to one of ordinary skill in the art at the time invention was made to have a stamp with varying recesses to micro print features of varying dimensions.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Whitesides et al (US 5900160) in view of Biebuyck et al (US 5817242) as applied to claim 6 and further in view of Whitesides et al (Article Soft lithography Angew. Chem. Int. Ed. 1998, vol. 37 pages 551-575).

White sides et al disclose replica from a master as in claim 6 but do not disclose expressly that a replica could be made of a stamp body.

However Whitesides et al in their article (page 562- 4.1 A) show that method of making replica of a rigid mold as well as an elastomer mold had been demonstrated at nanometer scale.

Therefore making a replica of stamp body of claim 6 would have been obvious to one of ordinary skill in the art at the time invention was made so as to be able to pattern with the same polarity as the original stamp.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Whitesides et al (US 5900160) in view of Biebuyck et al (US 5817242) as applied to claim 13 and further in view of Choquette et al (US 6245412).

Biebuyck et al disclose application of fluorinated silane for separation layer but do not disclose that the layer could be deposited in vacuum like vapor deposition.

Choquette et al disclose use of fluorinated silane for separation layer and disclose that methods for this by vapor deposition were well known (Col 4 lines 6-9).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have separation layer of fluorinated silane vacuum deposited for uniformity of thickness.

Response to Amendment

7. Applicant's amendments filed 8/24/2004 have been fully considered but not found to be persuasive.

Applicant argues that the office action fails to identify any teaching that would indicate a need for recesses of significantly different sizes.

The need for recesses of different size as explained above is due to the fact that it would be of no advantage to limit the use of stamp to pattern recesses of the same size since in real life different sized features would be needed. Biebuyck et al disclose different sized features.

Applicant argues that the office action suggests using the anisotropic etching of the '160 teachings to create the different sized apertures of the '242 reference without identifying how the '160 etching would create the '242 different sized apertures.

The office action does not suggest applying the teaching of Whitesides et al '160 to create different sized apertures of Biebuyck et al '242. Instead, the office action emphasizes that method to create different sized apertures would be no different-change of masking is all that would be needed. Reference of Hawkins et al has been used, not to modify or substitute for any deficiency but to show that in a single isotropic etch varying depths will be obtained for different

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size of vias. Biebuyck et al has been used to show the existence of variable sized apertures and features and the teaching of an unmolding agent.

Applicant argues that the Young's modulus greater than 10^6 N/m² has not been disclosed.

This issue has been more clearly explained in the rejection.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 571 272 1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RK

P. Hassanzadeh
primary Examiner
AU 1763